

CLAIMS

I CLAIM:

1. A hollow metal fitting for use in making a welded metal joint with reduced residual stresses, which fitting comprises

A. an internal annular shoulder having an inner diameter; and

B. an annular wall which

(1) extends from the shoulder,

(2) has a cylindrical inner surface,

(3) has a cylindrical outer surface whose diameter is greater than the inner diameter of the shoulder,

(4) defines with the shoulder a cylindrical socket having a common longitudinal axis with the annular wall, and

(5) has an end surface connecting the cylindrical outer and inner surfaces, which end surface is chamfered so that the inner surface extends beyond the outer surface in the axial direction and so that the end surface, as viewed in a cross section taken along the longitudinal axis of the annular wall, is concave.

2. A fitting according to claim 1 wherein the chamfered end surface terminates in an annular lip at the cylindrical inner surface of the annular wall.

3. A fitting according to claim 1 wherein the chamfered end surface terminates, at the cylindrical inner surface of the annular wall, in an annular lip connected to an annular ring by thin, radially spaced bars which are parallel to the longitudinal axis.

4. A fitting according to claim 3 wherein the annular ring is thicker than the bars in a direction perpendicular to the longitudinal axis.

5. An assembly ready to be welded to form a socket-welded metal joint with reduced residual stresses resulting from the welding, which assembly comprises

A. a hollow metal fitting which includes

(1) an internal annular shoulder having an inner diameter; and

(2) an annular wall which

(a) extends from the shoulder,

(b) has a cylindrical inner surface,

(c) has a cylindrical outer surface whose diameter is greater than the inner diameter of the shoulder,

(d) defines with the shoulder a cylindrical socket having a common longitudinal axis, and

(e) has an end surface connecting the cylindrical outer and inner surfaces, which end surface is chamfered so that the inner surface extends beyond the outer surface in the axial direction and has a profile such that, as viewed in a cross section taken along the longitudinal axis, there is an angle in the range of from 100 degrees to 120 degrees between the major portion of the end surface and said longitudinal axis; and

B. a metal pipe which includes a cylindrical outer surface and a cylindrical inner surface, with one end of the pipe being disposed in the socket so that the outer surface of the pipe is within the inner surface of the annular wall of the socket;

whereby the assembly is ready to be welded by an annular weld which adheres the chamfered end surface of the fitting to the cylindrical outer surface of the pipe.

6. An assembly according to claim 5 wherein the outer surface of the pipe is cylindrical over its entire length.

7. An assembly according to claim 5 wherein the chamfered end surface, as viewed in said cross section, includes a straight line.

8. An assembly according to claim 5 wherein the chamfered end surface, as viewed in said cross section, is a straight line.

9. An assembly according to claim 5 wherein the chamfered end surface, as viewed in said cross section, is concave.

10. An assembly according to claim 5 wherein the chamfered end surface terminates in an annular lip at the cylindrical inner surface of the annular wall.

11. An assembly according to claim 5 wherein the chamfered end surface terminates, at the cylindrical inner surface of the annular wall, in an annular lip connected to an annular ring by radially spaced bars which are parallel to the longitudinal axis.

12. An assembly according to claim 11 wherein the annular ring is thicker than the bars in a direction perpendicular to the longitudinal axis.

13. An assembly according to claim 5 wherein the chamfered end surface terminates, at the cylindrical inner surface of the annular wall, in an annular lip spaced from an annular metal ring surrounding the pipe, which annular ring is separate from the fitting.

14. A socket welded metal joint with reduced residual stresses resulting from the welding, which joint comprises

A. a hollow metal fitting which includes

(1) an internal annular shoulder having an inner diameter; and

(2) an annular wall which

(a) extends from the shoulder,

(b) has a cylindrical inner surface,

(c) has a cylindrical outer surface whose diameter is greater than the inner diameter of the shoulder,

(d) defines with the shoulder a cylindrical socket having a common longitudinal axis, and

(e) has an end surface connecting the cylindrical outer and inner surfaces, which end surface is chamfered so that the inner surface extends beyond the outer surface in the axial direction;

B. a metal pipe which includes a cylindrical outer surface and a cylindrical inner surface, with one end of the pipe being disposed in the socket so that the outer surface of the pipe is within the inner surface of the annular wall of the socket; and

C. an annular weld which

(1) adheres the chamfered end surface of the fitting to the cylindrical outer surface of the pipe,

(2) includes both added bead metal and fused base metal of the annular wall and pipe, and

(3) has a profile such that, as viewed in a cross section taken along the longitudinal axis, there is an angle in the range of from 100 degrees to 120 degrees between (a) the major portion of the interface between said added bead metal and said fused base metal of the annular wall, and (b) said longitudinal axis.

15. A joint according to claim 14 wherein the outer surface of the pipe is cylindrical over its entire length.

16. A joint according to claim 14 wherein the interface between said added bead metal and said fused base metal of the annular wall and the pipe, as viewed in said cross section, includes a straight line.

17. A joint according to claim 14 wherein the interface between said added bead metal and said fused base metal of the annular wall and the pipe, as viewed in said cross section, is a straight line.

18. A joint according to claim 14 wherein the interface between said added bead metal and said fused base metal of the annular wall and the pipe, as viewed in said cross section, is concave.